



Unit 6 Lesson 2

Juliet

"Romeo, Romeo, where are you?" calls Juliet. Romeo, being the practical sort, determines the length of the shortest ladder that he should use to reach Juliet. To help Romeo determine which ladder to use, follow the directions listed below.

Directions:

- Cut out each ladder.
- Fold **Damsel in Distress** along the fold line to create a right angle.
- Place the base of each ladder in the indicated location.
- Determine which ladder exactly reaches to the base of Juliet's window.
- Answer the questions below.

- 1 On the drawing, what is the distance in centimeters from the base of the ladder to the base of the building?
- 2 Use the scale to determine the actual distance from the base of the ladder to the base of the building.
- 3 On the drawing, what is the distance in centimeters from the base of the building to the bottom of Juliet's window?
- 4 Use the scale to determine the actual distance from the base of the building to the bottom of Juliet's window.
- 5 What is the actual length of the ladder that Romeo should use to reach the base of Juliet's window?

Exploring Triangles

1 Measure each side length on **Triangles** to the nearest tenth of a centimeter. Then complete the table.

Triangle	Type of triangle	a (cm)	b (cm)	c (cm)	a^2	b^2	c^2	Does $a^2 + b^2 = c^2$?
1								
2								
3								
4								
5								
6								

2 What do you notice about the length of side c in each triangle compared to the lengths of sides a and b ?

3 What do you notice about the sum of a^2 and b^2 in the right triangles listed in your table?

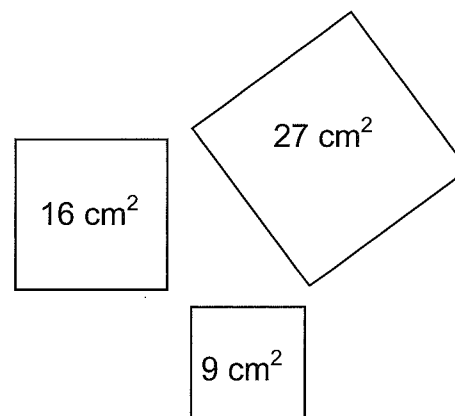
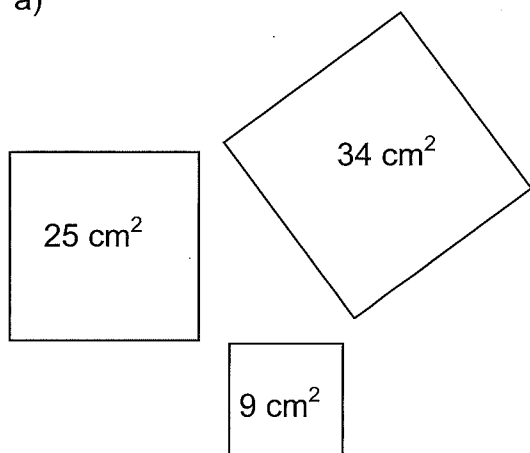


Exploring Triangles

4 Based on your observations from the previous table, complete the table below.

	Type of triangle	a (cm)	b (cm)	c (cm)	a^2	b^2	c^2
a)	right	6					100
b)	right	10	24				
c)	right		12		81		
d)	right			20		256	

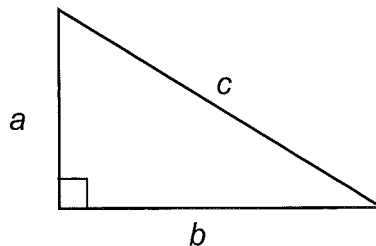
5 When joined at their vertices, can the squares be used to form a right triangle? Justify your answer.





Using the Pythagorean Theorem

Use the given triangle to determine the length of the missing side to the nearest tenth.



1 $a = 3, b = 4, c = \underline{\hspace{2cm}}$

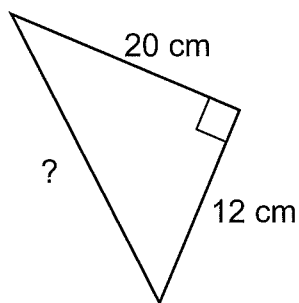
2 $a = 1, b = 2, c \approx \underline{\hspace{2cm}}$

3 $a = 15, b = \underline{\hspace{2cm}}, c = 25$

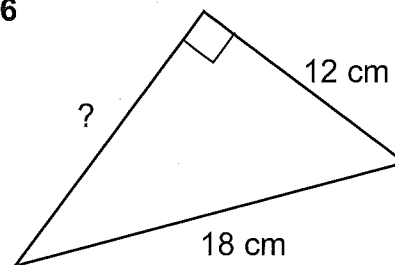
4 $a = \underline{\hspace{2cm}}, b = 15, c = 17$

Determine the missing length to the nearest tenth.

5



6





Unit 6 Lesson 2

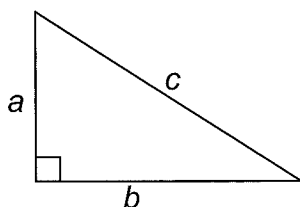
Pythagorean Theorem Scavenger Hunt Recording Sheet

Problem on Page A	Problem on Page B
Problem on Page C	Problem on Page D
Problem on Page E	Problem on Page F
Problem on Page G	Problem on Page H
Problem on Page I	Problem on Page J



Independent Practice

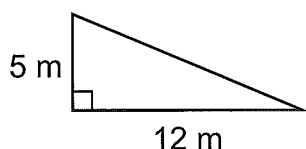
The Pythagorean Theorem states that for all right triangles $a^2 + b^2 = c^2$ where a and b are the legs of the triangle and c is the hypotenuse. If 2 side lengths of a right triangle are known, the Pythagorean Theorem can be used to find the third length.



Pythagorean Theorem
 $a^2 + b^2 = c^2$

Example 1

Find the missing side length.



$$\begin{aligned} a^2 + b^2 &= c^2 \\ 5^2 + 12^2 &= c^2 \\ 25 + 144 &= c^2 \\ 169 &= c^2 \end{aligned}$$

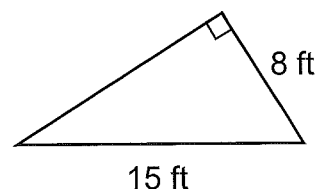
Therefore,

$$\sqrt{169} = 13 = c$$

The missing side length is 13 meters.

Example 2

Find the missing side length.



$$\begin{aligned} a^2 + b^2 &= c^2 \\ 8^2 + b^2 &= 15^2 \\ 64 + b^2 &= 225 \\ b^2 &= 225 - 64 \\ b^2 &= 161 \end{aligned}$$

Therefore,

$$b = \sqrt{161} \approx 12.7$$

The missing side length is 12.7 feet.

Solve each problem. Round your answers to the nearest tenth.

- 1 The hypotenuse of a right triangle is 40 meters long, and one of its legs is 18 meters long. Find the length of the other leg.

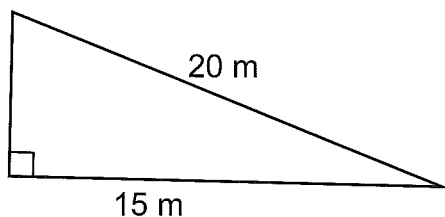
- 2 A ladder that is 10 feet long leans against a building. The bottom of the ladder is 4 feet away from the base of the building. How far up the side of the building does the ladder reach?



Unit 6 Lesson 2

- 3 The floor mat used in gymnastics measures 40 feet by 40 feet. Gymnasts use the diagonal of the mat for most of their tumbling patterns. How many feet are available to the gymnasts by using the diagonal of the mat for their tumbling patterns?

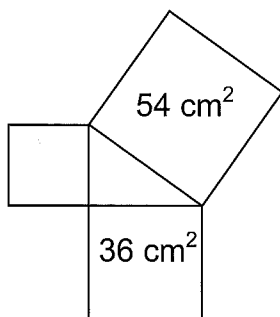
- 4 A ramp used in skateboarding competitions is shown below.



How high is the ramp?

- 5 A bird leaves its nest and flies 12 kilometers due west. The bird then flies 9 kilometers due north. How far is the bird from its nest?

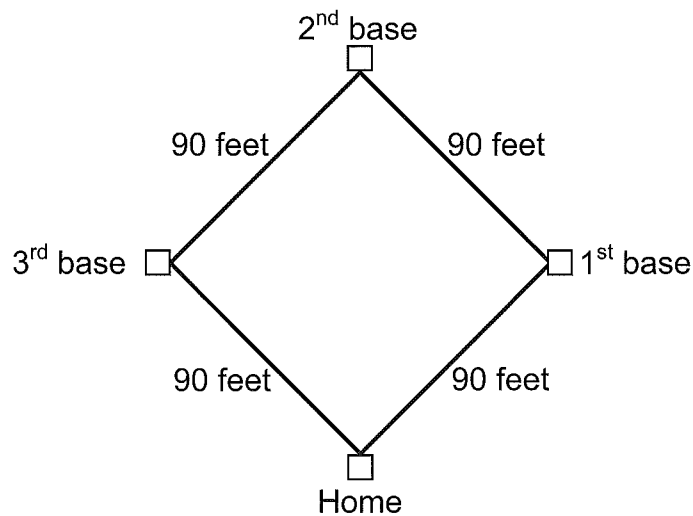
- 6 The vertices of 3 squares are joined to form a right triangle. What is the area of the smallest square?



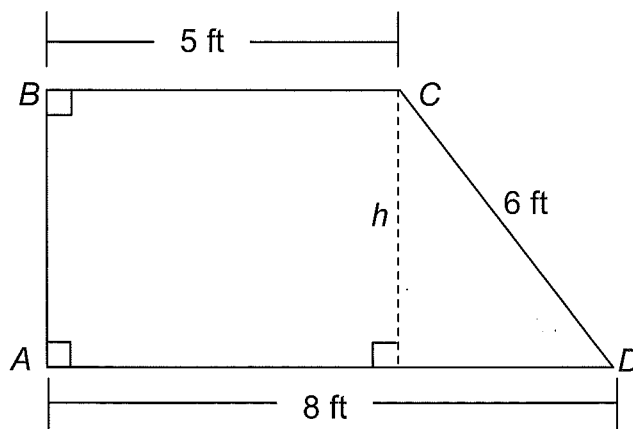


- 7 Chuck has drawn a triangle with side lengths of 5 inches, 7 inches, and 9 inches. He claims that he has drawn a right triangle. Is he correct? Justify your answer.

- 8 A baseball diamond is shown in the diagram below. If a player is standing on first base and another player is standing on third base, what distance separates these 2 players?



- 9 Trapezoid $ABCD$ is shown below.



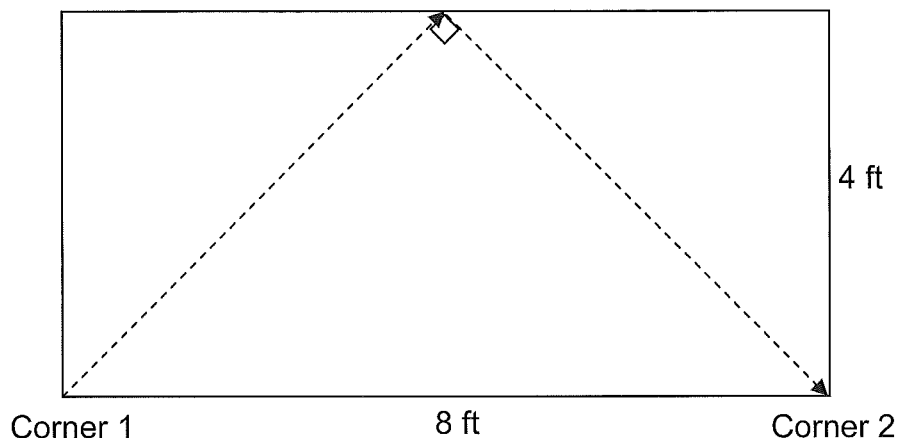
What is h , the approximate height of the trapezoid?



Unit 6 Lesson 2

That's the Way the Ball Bounces

Bill is shooting pool. The cue ball travels from Corner 1 to Corner 2 by first bouncing off the midpoint of the opposite side. What is the total distance to the nearest tenth of a foot that the cue ball traveled?



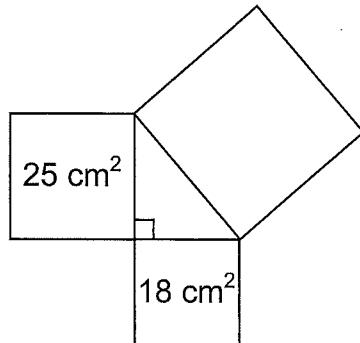
FOR TEACHER USE ONLY:

a. YES NO Student arrives at a correct solution?

	4	3	2	1
b. Conceptual Knowledge				
c. Procedural Knowledge				
d. Communication				



- 1 The vertices of 3 squares are joined to form a right triangle. What is the area of the largest square?



- A 6.5 cm^2
 B 7 cm^2
 C 33 cm^2
 D 43 cm^2

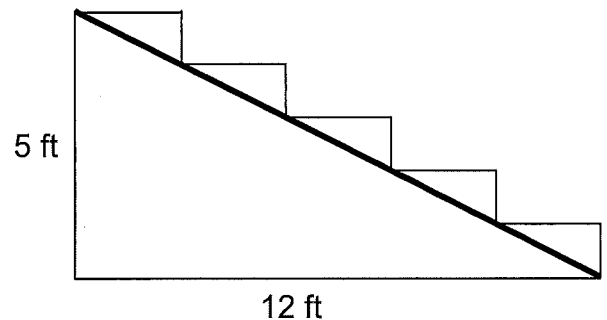
- 2 The screen on a computer monitor has a length of 15 inches and a width of 12 inches. What is the length of the diagonal to the nearest tenth of an inch?

- A 27.0 inches
 B 19.2 inches
 C 16.4 inches
 D 9.0 inches

- 3 A square tabletop has an area of 9 square feet. What is the length of the diagonal of the tabletop to the nearest tenth of a foot?

- A 4.2 feet
 B 6.4 feet
 C 12.7 feet
 D 18.0 feet

- 4 A set of steps is 12 feet long and 5 feet high. The steps are being replaced by a handicap ramp as indicated by the bold line in the diagram below.



What will be the length of the ramp to the nearest foot?

- A 17 ft
 B 13 ft
 C 11 ft
 D 7 ft